Walchand College of Engineering, Sangli
(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Second Year B. Tech., Sem III
Course Code	
Course Name	Probability and Statistics
Desired Requisites:	Engineering Maths

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	2 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
		Credits: 2			

Course Objectives

1	To understand the basic concepts of probability and statistics for mathematical estimations.
2	To study different mathematical models based on statistical.
3	To analyze statistical and fuzzy systems.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Apply knowledge of statistical design for engineering problem	III	Applying
CO2	Formulate few real life problems using the models	III	Applying
CO3	Solve and analyze problems for better results	IV	Analysing

Module	**Module Contents**	**Hours**
I	**Random Variable:** Discrete random variable, Continuous random variable, probability mass function, cumulative distribution function, bivariate discrete random variable, joint probability distribution, joint distribution function of two dimensional discrete random variable.	4
II	**Probability Distribution :** Gaussian distribution, Exponential distribution, Uniform distribution.	4
III	**Statistical Methods:** Measure of Central tendency, Measure of dispersion, Range, Quartile deviation, Mean deviation, variance, Standard deviation, Coefficient of variance, moments, Symmetry, Skewness, Kurtosis, and Types of Kurtosis.	5
IV	**Population and Sample:** Introduction, Types of Characteristics: Attributes and variables, Collection and Organization of data, Population and sample, Methods of sampling.	3
V	**Exact Sampling Distribution:** Chi- square distribution: definition and its properties, Student t- distribution: definition and its properties.	4
VI	**Test of Hypothesis** Random samples, parameter, statistic, standard error of statistic, null and alternative hypothesis, critical region, level of significance, Types of error, large sample test, Small sample test	6

Textbooks

1	Gupta and Kapoor, *"Fundamental of Mathematical Statistics",* Sultan Chand & Sons, 1st edition, 2018
2	Vijay Rohatgi, *"An Introduction to probability and statistics",* Willey, 2nd edition, 2000

References	
1	S.Ross, *"Probability and Statistics for Engineers and Scientists",* Academic Press, 5th edition, 2014

Useful Links	
1	https://nptel.ac.in/courses/111/105/111105041/

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	1												1	
CO2	2				2									
CO3					3									

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.
ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Walchand College of Engineering, Sangli
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AY 2022-23

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Second Year B. Tech., Sem III
Course Code	
Course Name	Discrete Mathematics
Desired Requisites:	Fundamentals of algebra and calculus.

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
		Credits: 3			

Course Objectives

1	To impart logical thinking and its application to computer science.
2	To inculcate ability to reason and ability to present a coherent and mathematically accurate argument
3	To present the knowledge and skills obtained to investigate and solve a variety of discrete mathematical problems

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Related the fundamental mathematical concepts in Discrete Mathematics to computer Science	III	Applying
CO2	Apply concepts of set theory, graph theory, algebraic structures.	III	Applying
CO3	Estimate the optimized solutions for various problems in Computer Science.	IV	Analysing

Module	**Module Contents**	**Hours**
I	**Sets and Proposition:** Introduction, Combinations of Sets, Finite and Infinite Sets, Uncountably Infinite Sets, Mathematical Induction, Principle of Inclusion and Exclusion, Multisets. Propositions, Logical Connectives, Conditional and Biconditionals, Well-Formed Formulas, Tautologies, Logical Equivalences, Theory of Inference for Statement Calculus, Predicate Calculus, The Statement Function, Variable and Quantifiers, Free and Bound Variable, Inference Theory of Predicate Calculus, Methods of Proof, Euclidean Algorithm.	7
II	**Relation and Functions:** Introduction, A Relational Model for Data Bases, Properties of Binary Relation, Warshall's Algorithm, Equivalence Relation and Partition, Partial Ordering Relation and Lattices, Chain and Antichains, A Job-Scheduling Problem, Compatible Relation, Functions, Composition of Functions, Invertible Functions.	6
III	**Graphs and Planar Graphs:** Introduction, Basic Terminologies, Multigraphs and Weighted Graphs, Digraphs and Relation, Representation of Graphs, Operations on Graphs, Paths and Circuits, Graph Traversal, Shortest Path in Weighted Graphs, Eulerian Paths and Circuits, Hamiltonian Paths and Circuits, Traveling Salesperson Problem, Factors of Graph, Planar Graph, Graph Colouring.	7

IV	**Trees and Cut-Sets:** Trees, Rooted Trees, Path Length in Rooted Trees, Prefix Codes, Binary Search Tree, Spanning Trees and Cut-Sets, Minimum Spanning Trees, Krushkal's Algorithm, Prim's Algorithms, Transport Network.	7
V	**Algebraic Structures:** Introduction, Groups, Subgroups, Generators and Evaluation of Powers, Cosets and Lagrange's Theorem, Permutation Groups, Codes and Group Codes, Isomorphisms and Automorphisms, Homomorphisms and Normal Subgroups, Rings, Integral Domains, and Fields, Ring Homomorphisms, Polynomial Rings and Cyclic Codes.	7
VI	**Boolean Algebras:** Lattices and Algebraic Systems, Principle of Duality, Basic Properties of Algebraic System Defined by Lattices, Distributive and Complemented Lattices, Boolean Lattices and Boolean Algebras, Uniqueness of Finite Boolean /expressions	6

Textbooks	
1	C. L. Liu, D P Mohapatra, *"Elements of Discrete Mathematics: A Computer Oriented Approach"*, TMG, 3rd Edition, 2011.
2	J.P. Tremblay &R. Manohar*,"Discrete Mathematical structure with applications to computer"*,TMG, 1st Edition, 1997
3	Kenneth H. Rosen*," Discrete Mathematics and Its Application"*, TMG, 7th Edition, 2011

References	
1	K.D. Joshi, *"Foundation of Discrete Mathematics",* 2019
2	Lipschutz, Marc Lipson *,"Discrete mathematics",* Schaum'soutline series,3rd Edition, 2007

Useful Links	
1	https://nptel.ac.in/courses/106/106/106106183/
2	https://nptel.ac.in/courses/106/106/106106094/
3	https://nptel.ac.in/courses/111/107/111107058/

CO-PO Mapping

	Programme Outcomes (PO)												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	1												1	
CO2	2				2									
CO3					3									

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.
ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

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AY 2022-23

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Second Year B. Tech., Sem III
Course Code	
Course Name	Data Structures
Desired Requisites:	Programming in C including pointers and File Handling

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
		Credits: 3			

Course Objectives

1	To improve skills for programming in a systematic way.
2	To clarify the use of recursion in program development.
3	To familiarize linear and non-linear data structures and the algorithms.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Describe the fundamental concepts of structuring, managing and organizing the data for efficient access and manipulation	II	Understanding
CO2	Experiment the use of linear and non-linear data structures	III	Applying
CO3	Study simple memory and input/output interface	IV	Analysing

Module	**Module Contents**	**Hours**
I	**Introduction:** Basic Concepts: Algorithm, Pseudo-code, ADT, Data Structure, Algorithmic Efficiency, Recursion: Direct and Indirect recursion, analysis of recursive functions e.g. Towers of Hanoi, Ackerman's function, Introduction to Painters, Arrays and Structures.	6
II	**Linked Lists:** Concept of linked organization, Singly linked list, doubly linked list and dynamic storage management, circular linked list, Operations such as insertion, deletion, inversion, concatenation, computation of length, traversal on linked list, Representation and manipulations of polynomials using linked lists	6
III	**Stacks and Queues:** Fundamentals stack and queue as ADT, Representation and Implementation of stack and queue using sequential and linked organization, Circular queue: representation and implementation, Application of stack for expression evaluation and for expression conversion, Backtracking, Stacks and Recursion, Priority queue Doubly Ended Queue.	7
IV	**Trees:** Basic terminology, binary trees and its representation, binary tree traversals (recursive and nonrecursive), operations such as copy, equal on binary tree, expression trees, General Trees, Binary Search Trees, Heaps and its operations.	7

V	**Graphs:** Terminology and Representation of graphs using adjacency matrix, adjacency list and adjacency Multi-list, Traversals Depth First and Breadth First, Minimum Spanning Tree	5
VI	**Searching & Sorting Technique:** **Search:** Importance of searching, Sequential, Binary, Fibonacci search algorithms, Sorting: Internal and External Sorts, Insertion, Shell, Heap, Quick sort, Merge sort, Radix sort, Two-way merge sort **Hashing:** Hashing functions, overflow handling with and without chaining, open addressing: linear, quadratic, double, rehashing, Indexing Techniques: hashed indexes, Tree indexing – Btrees (concept only implementation not expected), File Handling.	8

Textbooks	
1	Richard F. Gilberg, Behrouz A. Forouzan, "*Data Structures, A Pseudocode Approach With C*", Cengage Learning, 2nd Edition, 2005
2	S. Lipschutz, "*Data Structures with C*", Schaum's Outlines Series, Tata McGraw-Hill, 1st edition, 2010
3	Narsimha Karumanchi "Data Structure and algorithms", Careermonk 5th edition, 2011
References	
1	Yashavant Kanetkar, "*Understanding pointers in C*", 3rdedition, BPB Publication
2	Brian W. Kernighan and Dennis M. Ritchie, "*The C Programming Language*", 2ndEdition, Prentice Hall of India
Useful Links	
1	https://nptel.ac.in/courses/106/102/106102064/
2	https://nptel.ac.in/courses/106/106/106106127/
3	https://nptel.ac.in/courses/106/103/106103069/

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2				1									
CO2		3											1	
CO3		1			2								1	

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.
ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

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AY 2022-23

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Second Year B. Tech., Sem III
Course Code	
Course Name	Microprocessors
Desired Requisites:	First year Information Technology Basic Electronics course.

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
		Credits: 3			

Course Objectives

1	To introduce the fundamental principles of logic design
2	To demonstrate the basic building blocks and operations of 8/16/32 bit microprocessors & concept multiple processor systems.
3	To inculcate the ability to design assembly language programs.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Discuss the concepts of digital logic to design the circuits	II	Understanding
CO2	Utilize the architecture and organization of microprocessors with instruction set to design assembly language programs	III	Applying
CO3	Design solution to using appropriate web frameworks	IV	Analysing

Module	**Module Contents**	**Hours**
I	**Digital Electronics:** Combinational logic & sequential logic design, excitation table, state transition diagram, system design.	6
II	**Processor basics & 8085 microprocessor:** CPU organization, Introduction to processor technology, microprocessor architecture, single chip microcomputer, microcomputer systems. The 8085 MPU, parametric considerations, internal architecture, introduction to 8085 assembly language programming, 8085 instructions.	7
III	**Programming techniques & interfacing:** Writing assembly language programs, debugging, looping, counting, indexing, arithmetic operations related to memory, counters & delays, stacks, Interrupts, I/O (USB) interface, data communication.	7
IV	**Introduction to 8086:** Functional & architectural comparison of 8085 & 8086, programming, implementing standard programming structures in 8086, string, procedure & macros.	6
V	**Introduction to 80386:** Features & architecture of 80836, Pin description, 80836 register set, special 80386 registers, 80386 Real mode memory segmentation, data types used in real mode, instruction format, addressing modes of 80386.	6
VI	**80386 Memory Segmentation:** Memory management through segmentation, address translation, protection in segmentation, introduction to protected mode	7

Textbooks	
1	M. Morris Mano & Michael D. Ciletti,"*Digital Design*", Pearson Prentice Hall publication, 4th Edition, 2008
2	Ramesh S. Gaonkar, "*Microprocessor architecture, programming & applications*", New Age International publication,5th edition, 2015
3	A K Ray & K M Bhurchandi, "*Advanced microprocessors & peripherals*", second edition, Tata McGraw-Hill education private limited, 2ndedition, 2012.
References	
1	Floyd & Jain, "*Digital fundamentals*", Pearson education, eighth edition, 2007.
2	James Turley, "*Advanced 80386 programming techniques*", Tata McGraw-Hill, second edition, 2005.
Useful Links	
1	https://nptel.ac.in/courses/106/108/106108100/
2	https://nptel.ac.in/courses/108/107/108107029/
3	https://nptel.ac.in/courses/108/105/108105102/

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1			2		1									
CO2		1											2	
CO3			1										1	

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.
ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

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AY 2022-23

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Second Year B. Tech., Sem III
Course Code	
Course Name	Data Communication
Desired Requisites:	Basics of communication

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
		Credits: 3			

Course Objectives

1	To discuss the concepts of data communication system.
2	To instruct multiplexing and encoding schemes.
3	To impart circuit and packet switching techniques

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Summarize the components involved in data communication system	II	Understanding
CO2	Identify different encoding schemes.	IV	Analysing
CO3	Discuss packet switching and circuit switching techniques	IV	Analysing

Module	**Module Contents**	**Hours**
I	**Introduction to data communication:** Data Communications and Networking for Today's Enterprise, A Communications Model, Data Communications, Networks, and The Internet-An Example Configuration.	6
II	**Data Transmission:** Data communication Concepts and Terminology: Analog and Digital Data Transmission, Transmission Impairments, Channel Capacity. Media:- Guided Transmission Media, Wireless Transmission, Wireless Propagation, Line-of-Sight Transmission	6
III	**Encoding techniques:** Digital Data- Digital Signals, Digital Data- Analog Signals, Analog Data- Digital Signals, Analog Data- Analog Signals. Digital data communication techniques:- Asynchronous and Synchronous Transmission, Types of Errors, Error Detection and Correction, Hamming Code, CRC, Checksum, Line Configurations.	7
IV	**Multiplexing:** Frequency Division Multiplexing, Synchronous Time Division Multiplexing, Statistical Time Division Multiplexing, Asymmetric Digital Subscriber Line, xDSL. Spread Spectrum:- The Concept of Spread Spectrum, Frequency-Hopping Spread Spectrum, Direct Sequence Spread Spectrum, Code Division Multiple Access.	7
V	**Telephone Network:** Telephone network for data transmission, Modems, Latest telephone communication and interfacing techniques.	5

VI	**Switching techniques:** Switched Communication Networks, Circuit-Switching Networks, Circuit-Switching Concepts, Soft switch Architecture, Packet-Switching Principles	8

Textbooks	
1	William Stallings, "*Data and Computer Communications*", PHI, 9th Edition, 2011.
2	Behrouz A. Forouzan, "*Data communication and Networking*", TMGH, 5th Edition, 2013.
3	Wayne Tomasi, "*Introduction to Data Communication and Networking*", Pearson, 2007

References	
1	Achyut S Godbole and Atul Kahate, "*Data Communications and Networks*", TMGH, 2nd Edition, 2008.
2	Simon Haykin ,"*Digital Communication Systems*", Wiley, 1st Edition,2014.
3	Simon Haykin and Michael Moher, *" Introduction to Analog and Digital Communications* ", Wiley, 2nd Edition 2007

Useful Links	
1	https://nptel.ac.in/courses/106/105/106105082/
2	https://nptel.ac.in/courses/106/108/106108098/
3	https://nptel.ac.in/courses/106/105/106105080/

CO-PO Mapping

	Programme Outcomes (PO)												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1			3											
CO2		2			1									
CO3							3		2		2			

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.
ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Walchand College of Engineering, Sangli
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AY 2022-23

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Second Year B. Tech., Sem III
Course Code	
Course Name	Data Structures Lab
Desired Requisites:	Programming in C including pointers and File Handling

Teaching Scheme		**Examination Scheme (Marks)**			
Practical	2 Hrs/ Week	**LA1**	**LA2**	**Lab ESE**	**Total**
Interaction	-	30	30	40	100
		Credits: 1			

Course Objectives

1	To develop skills in programming and preparing the students for advanced computer science courses.
2	To clear up the concept of ADT and to use appropriate data structure for modelling
3	given problem.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Implement various data structures	III	Applying
CO2	Demonstrate the use of various data structures in application programs	III	Applying
CO3	Compare various data structures	VI	Creating

List of Experiments / Lab Activities/Topics

List of Lab Activities:

1. Program based on structures and pointers in C
2. Program based on arrays and pointers in C
3. File handling and command line arguments
4. Implementation of recursion
5. Developing ADT for singly linked list and its applications
6. Developing ADT for Doubly linked list and its applications
7. Developing ADT for circular linked list and its applications
8. Developing ADT for stack and queue and their applications
9. Implementation of double ended queue
10. Implementation of recursive and non-recursive tree traversals
11. Binary search tree and application
12. Implementation of graph, DFS, BFS
13. Implementation of searching : linear search, binary search, Fibonacci search
14. Sorting Methods: Insertion sort, shell sort, heap sort, quick sort, merge sort, radix sort etc.
15. Implementation of hashing

Textbooks

1	Richard F. Gilberg, Behrouz A. Forouzan, "Data Structures, A Pseudocode Approach With C", Cengage Learning, 2nd Edition, 2005

2	S. Lipschutz, “Data Structures with C”, Schaum's Outlines Series, Tata McGraw-Hill, 1st edition, 2010
3	Narsimha Karumanchi “Data Structure and algorithms”, Careermonk 5th edition, 2011
References	
1	Yashavant Kanetkar, “*Understanding pointers in C*”, 3rdedition, BPB Publication
2	Brian W. Kernighan and Dennis M. Ritchie, “*The C Programming Language*”, 2ndEdition, Prentice Hall of India
Useful Links	
1	https://nptel.ac.in/courses/106/102/106102064/
2	https://nptel.ac.in/courses/106/106/106106127/
3	https://nptel.ac.in/courses/106/103/106103069/

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1		1	2											
CO2				3	2									
CO3				2									2	

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO, and preferably to only one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%

Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

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AY 2022-23

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Second Year B. Tech., Sem III
Course Code	
Course Name	Microprocessors Lab
Desired Requisites:	First year Information Technology Basic Electronics course.

Teaching Scheme		**Examination Scheme (Marks)**			
Practical	2 Hrs/ Week	**LA1**	**LA2**	**Lab ESE**	**Total**
Interaction	-	30	30	40	100
		Credits: 1			

Course Objectives

1	To demonstrates the fundamental principles of logic design.
2	To show & explain the basic building blocks and operations of 8/16/32 bit microprocessors & concept multiple processor systems.
3	To make students to be able to design assembly language programs.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Classify the concepts of combinational and sequential logic to design real life applications circuits & analyze it.	III	Applying
CO2	Use instruction sets & form structured microprocessor programs in assembly language	III	Applying
CO3	Test and debug microprocessor programs	IV	Analysing

List of Experiments / Lab Activities/Topics

List of Lab Activities:

1. Designing of a circuit using Combinational logic.
2. Designing of a combinational circuit using MUX & DEMUX
3. Study Half Adder & Subtractor, Full Adder & Subtractor
4. Implement below addressing modes & perform Addition, subtraction of two 8 – bit Numbers with 16 – bit answer. Register addressing mode. Immediate Addressing Mode. Direct Addressing mode. Indirect Addressing mode.
5. Study 8085 kit & design a program of Block Transfer & Block Exchange.
6. Implement LHLD & DAD instruction & analyze the program of Addition & subtraction of two 16 – bit numbers.
7. Implement repetitive addition & subtraction algorithms for 8 bit multiplication & 8 bit division.
8. Assembly level program to calculate sum of series of numbers.
9. Assembly level program to find smallest & largest number from series of numbers.
10. Use subroutines & arrange a series of Numbers in ascending & descending order.
11. Design a program for Conversion HEX to Binary number.
12. Solve programs listed above using 8085 simulator.
13. Solve programs listed above using 8086 & 80386 instruction set in MASM
14. Smart traffic light control simulator

Textbooks

1	M. Morris Mano & Michael D. Ciletti,"*Digital Design*", Pearson Prentice Hall publication, 4th Edition, 2008
2	Ramesh S. Gaonkar, "*Microprocessor architecture, programming & applications*", New Age International publication,5th edition, 2015
3	A K Ray & K M Bhurchandi, "*Advanced microprocessors & peripherals*", second edition, Tata McGraw-Hill education private limited, 2ndedition, 2012.
References	
1	Floyd & Jain, "*Digital fundamentals*", Pearson education, eighth edition, 2007.
2	James Turley, "*Advanced 80386 programming techniques*", Tata McGraw-Hill, second edition, 2005.
Useful Links	
1	https://nptel.ac.in/courses/106/108/106108100/
2	https://nptel.ac.in/courses/108/107/108107029/
3	https://nptel.ac.in/courses/108/105/108105102/

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1				2										
CO2			1										2	
CO3					2				1					

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO, and preferably to only one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%

Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

Walchand College of Engineering, Sangli
(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Second Year B. Tech., Sem III
Course Code	
Course Name	C and CPP Programming Lab
Desired Requisites:	C Programming

Teaching Scheme		**Examination Scheme (Marks)**			
Practical	2 Hrs/ Week	**LA1**	**LA2**	**Lab ESE**	**Total**
Interaction	-	30	30	40	100
		Credits: 2			

Course Objectives

1	To learn the fundamental programming concepts and methodologies which are essential to building good C/C++ programs
2	To practice the fundamental programming methodologies in the C/C++ programming language via laboratory experiences
3	

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Define the object-oriented programming approach in connection with C++	III	Applying
CO2	Apply the concepts of object-oriented programming	III	Applying
CO3	Analyze virtual and pure virtual function & complex programming situations	IV	Analysing

Module	**Module Contents**	**Hours**
I	**C++ Programming basics:** What is object oriented programming? Why do we need object oriented. Programming characteristics of object-oriented languages C and C++.Output using cout. Directives. Input with cin. Type bool. The setw manipulator. Type conversions. Returning values from functions. Reference arguments. Overloaded function. Inline function. Default arguments. Returning by reference.	**2**
II	**Object and Classes :** Introduction Creating a class and objects Defining member functions inside and outside class definition Nesting of member functions Private member functions Arrays within a class Memory allocation of objects Static data members and static member functions Array of objects ,Objects as function arguments Friend functions Returning objects Constructors Types of constructor Destructors	**6**
III	**Polymorphism:** Overloading unary operations. Overloading binary operators, data conversion, pitfalls of operators overloading and conversion keywords. Explicit and Mutable.	**4**
IV	**Inheritance-I:** Concept of inheritance. Derived class and based class. Derived class constructors, member function, inheritance in the English distance class, class hierarchies, inheritance and graphics shapes, public and private inheritance, aggregation: Classes within classes, inheritance and program development.	**4**

V	**Inheritance-II:** Multiple Inheritance, Multilevel Inheritance, Multilevel inheritance, Hybrid inheritance, Virtual Base class, Abstract classes	**4**
VI	**Templates**: Class Templates, Function templates, File read write in c++	**6**

List of Experiments / Lab Activities/Topics

List of Lab Activities:

1. Program on input/output stream
2. Program on class and objects.
3. Program on Inline/Friend functions.
4. Program on Constructor/Destructors.
5. Program static variables/class/functions.
6. Program on polymorphism.
7. Program on different types of inheritance.
8. Program on operator overloading.
9. Program on File Operations.
10. Program on Templates.

Textbooks

1	E.Balguruswamy, *"Object Oriented Programming C++"*, Tata McGraw Hill, 3rd Edition, 2006.
2	Bjarne Stroustrup, *"The C++ Programming language",* Third edition, Pearson Education.

References

1	Robert Laffore, *"Object Oriented Programming in c++",* SAMS publication, 4thEdition,2008.

Useful Links

1	https://nptel.ac.in/courses/106/105/106105151/
2	https://nptel.ac.in/courses/106/101/106101208/

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1				2										
CO2		2			3								2	
CO3			3		3								2	1

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO, and preferably to only one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%

Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

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AY 2022-23

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Second Year B. Tech., Sem III
Course Code	
Course Name	Python Programming Lab*
Desired Requisites:	Computer Programming

Teaching Scheme		**Examination Scheme (Marks)**			
Practical	2 Hrs/ Week	**LA1**	**LA2**	**Lab ESE**	**Total**
Interaction	-	30	30	40	100
		Credits: 2			

Course Objectives

1	To define the significance of Python in programming
2	To discuss the programming paradigms in Python
3	To make use of the different libraries of Python

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Implement the programming constructs in Python	III	Applying
CO2	Analyse built in model in Python programming	IV	Analysing
CO3	Design application using Python libraries	VI	Creating

Module	**Module Contents**	**Hours**
I	**Introduction to Python:** The basic elements of python, Branching Programs, Control Structures, Strings and Input, Iteration, Functions and scoping, Specifications, Recursion, Global variables.	**4**
II	**Advanced features of Python:** Modules, Files, System Functions and Parameters, Strings, Tuples, Lists and Dictionaries, Lists and Mutability, Functions as Objects.	**4**
III	**Classes and Object-Oriented Programming:** Abstract Data Types and Classes, Inheritance, Encapsulation and Information Hiding.	**4**
IV	**Python-Numpy and Pandas:** NumPy: Introduction, Numpy array, Numpy array indexing, Numpy operations. Pandas: Series, Data frames, managing missing data, groupby, merging & concatenation, operations, data input and data output.	**6**
V	**Python for Data Visualization:** Data Visualization through libraries like: Matplotlib, Seaborn, Plotly and Cufflinks, Geographical Plotting.	**4**
VI	**Text mining modelling using NLTK:** Text Corpus, Sentence Tokenization, Word Tokenization, Removing special Characters, Expanding contractions, Removing Stopwords, Correcting words: repeated characters, Stemming & lemmatization, Part of Speech Tagging, Feature Extraction, Bag of words model, TF-IDF model, Text classification problem	**6**

List of Experiments / Lab Activities/Topics

List of Lab Activities:

1. Problem solving using core Python functionality like strings, variables, functions.
2. Problem solving using core Python functionality like tuples, dictionary, list, objects
3. Problem solving using Class & object concepts.
4. Problem statement on inheritance in classes
5. Problem based on encapsulation in classes
6. Problem statement on array
7. Problem statement on NumPy libraries with different operations
8. Problem statement on Pandas libraries with different operations
9. Problem statement on data visualization using Matplot Libraries.
10. Problem statement on data visualization using Seaborn Libraries.
11. Problem statement on text mining application using NLTK

Textbooks	
1	R. Nageswara Rao, "*Core Python Programming*", Dreamtech Press, 2nd Edition, 2017
2	Chun, J Wesley, "*Core Python Programming*", Pearson, 2nd Edition, 2007 Reprint 2010
3	

References	
1	Barry, Paul, Head *First Python*, O Rielly,2nd Edition, 2010
2	Lutz, Mark, *Learning Python*, O Rielly, 4th Edition, 2009

Useful Links	
1	https://onlinecourses.nptel.ac.in/noc19_mg47/preview
2	https://docs.python.org/3/tutorial/
3	https://www.learnpython.org/

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1			2										3	
CO2				2	3							2		3
CO3									1			2		3

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO, and preferably to only one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%

Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

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AY 2022-23

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Second Year B. Tech., Sem III
Course Code	
Course Name	Presentation and Report Writing
Desired Requisites:	

Teaching Scheme		**Examination Scheme (Marks)**			
Practical	0 Hrs/ Week	**LA1**	**LA2**	**Lab ESE**	**Total**
Interaction	-	30	30	40	100
		Credits: 1			

Course Objectives

1	To convey ethical guidelines during technical content preparation and presentation
2	To use various report writing tools
3	To provide various relevant practices of presentation and report/paper writing

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Use appropriate charts, tables and figures in presentation and report	III	Appling
CO2	Compare and identify suitable tools towards practicing write-up and presentation	IV	Analysing
CO3	Create effective report and presentations of the technical work	VI	Creating

List of Experiments / Lab Activities/Topics

List of Experiments:

PART – A Technical Report Writing

1. Experiment 1: Writing technical reports using proper Tense and grammar.
2. Experiment 2: Study of various types of technical Reports
   Project report, Conference paper, Journal Paper, Intellectual Property Rights (IPR), Selection of paper type for possible publication.
3. Experiment 3: Study of technical report Structure - I
   Preamble, Abstract, Literature review/survey, Problem statement, Objectives
4. Experiment 4: Study of technical report Structure – II
   Methodologies, Results, Discussions, Conclusion, Acknowledgements
5. Experiment 4: Use of Bibliographies/references and proper citations in reports.
6. Experiment 5: Use of Citations, referring style and method of using citations.
7. Experiment 6: Study of Plagiarism
   a. Checking plagiarism, b. Minimizing plagiarism

PART – B Presentation

8. PPT's and Animations
9. Presentation structure, Number of slides and Time management
10. Presentation styles
11. Figures and Tables for data representations

Part –C Tools and Practices

12. MS Office, Open Office, Latex, Beamer, Flash, GNU Plot etc.
13. End Note; Mendeley, Grammarly, Ginger, 1 Checker, Turnitin etc.

Textbooks	
1	Kothari C. R, "Research Methodology", 2nd Edition, New Age International, 1990
2	Chopra Deepak and Sondhi Neena, "Research Methodology : Concepts and cases", 2nd Edition, Vikas Publishing House, New Delhi, 2015
3	
References	
1	Melville Stuart and Goddard Wayne, "Research Methodology: An Introduction For Science & Engineering Students", 1st Edition, Kenwyn Juta & Co. Ltd.,1996
2	G. Ramamurthy, "Research Methodology", 2nd Edition, Dream Tech Press, New Delhi, 2015
Useful Links	
1	https://onlinecourses.swayam2.ac.in/ntr21_ed23/preview Academic Research & Report Writing
2	https://onlinecourses.swayam2.ac.in/cec21_ge18/preview Academic Writing
3	https://onlinecourses.nptel.ac.in/noc21_ge12/preview Qualitative Research Methods And Research Writing
4	https://onlinecourses.nptel.ac.in/noc21_hs44/preview Effective Writing

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1						1		3						
CO2					2								1	
CO3					1					3				

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO, and preferably to only one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%

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LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

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AY 2022-23

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Second Year B. Tech., Sem IV
Course Code	
Course Name	Theory of Computation
Desired Requisites:	Discrete Mathematics

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
		Credits: 3			

Course Objectives

1	To discuss fundamentals of computer mathematics.
2	To describe grammar, languages and their relationships.
3	To impart automata designs as language descriptors and recognizers.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Outline problem formulation with relevant solving approaches	II	Understanding
CO2	Distinguish language based problems into suitable classes	III	Applying
CO3	Design abstract machines for language recognition and applications.	V	Evaluating

Module	**Module Contents**	**Hours**
I	**Proofs and Regular Languages** Types of Proofs, Mathematical Induction and Recursive definitions, Regular expressions & Regular languages, Operations on Regular languages	6
II	**Finite State Machines** Deterministic Finite Automata (DFA) representation, DFA design examples, Nondeterministic finite automata (NFA), NFA with Null (^) transitions, Equivalence of DFAs, NFAs and NFA-^s. Kleene's Theorem & Proofs, Minimization of DFA	8
III	**Grammars & Languages** Definition and Types of grammars and languages, Derivation trees and ambiguity, Context Free Languages (CFL) & Non CFL's., Union, Concatenation and Kleene's operations, Intersection and complements of CFLs, Pumping Lemma.	6
IV	**Push Down Automata (PDA)** Definition, Deterministic PDA, Types of acceptance and conversions to each other, PDA design examples, CFGs & PDAs., Top-Down, & Bottom-up parsing	7
V	**Chomsky Normal Form (CNF)** Context Free Grammar (CFG) & CNF notations, eliminating ^ production and unit productions from a CFG, Eliminating useless variables from CFG, CNF Significance, Applications	4

VI	**Turing Machines (TM)** Models of Computation, definition of TM as Language Acceptor, Combining TMs, Turing computable functions, TM design examples, Variations in TM, nondeterministic TM, and Universal TM.	8

Textbooks	
1	John C. Martin, *"Introduction to Languages & Theory of Computation",* TMH, 4th Ed. 2010
2	John E. Hopcraft, Rajeev Motwani, Jeffrey D. Ullman, *"Introduction to Automata Theory, Languages and Computations",* Pearson Edu. 3rd Ed. 2008
References	
1	J. P. Tremblay & R. Manohar, *"Discrete Mathematical Structures with Applications to Computer Science"*, TMH, 2008
2	Michael Sipser, *"Introduction to Theory of Computations",* Thomson Brooks/Cole, 3rd Ed. 2014
3	K.L.P. Mishra & N. Chandrasekaran, *"Theory of Computer Science",* PHI, 3rd Ed. 2006
Useful Links	
1	https://nptel.ac.in/courses/106/104/106104028/
2	https://cglab.ca/~michiel/TheoryOfComputation/TheoryOfComputation.pdf
3	https://www.geeksforgeeks.org/introduction-of-theory-of-computation/

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	3			3									
CO2		2			1									
CO3			3										1	

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.
ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Walchand College of Engineering, Sangli *(Government Aided Autonomous Institute)*					
AY 2022-23					
Course Information					
Programme	B.Tech. (Information Technology)				
Class, Semester	Second Year B. Tech., Sem IV				
Course Code					
Course Name	Computer Architectures				
Desired Requisites:	Digital Electronics, Microprocessor				
Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
		Credits: 3			

Course Objectives	
1	Provide fundamental knowledge of processors architecture.
2	Introduce the memory organization architecture.
3	Instruct the basic concepts of execution speedup by pipelining.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	Course Outcome Statement/s	Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Discuss the design issues in computer architecture	II	Understanding
CO2	Solve the problems for computer architecture optimization	III	Applying
CO3	Estimate the performance metrics for computer architecture	IV	Analyzeing

Module	Module Contents	Hours
I	**Machine instructions and program execution** Memory locations & addresses, memory operations, instructions & instruction sequencing, addressing modes, subroutines, encoding of machine instructions.	4
II	**Arithmetic design** Design of signed multiplication, Booth's algorithm, bit-pair recording, division, floating point numbers and operations, guard bits and rounding.	5
III	**Control design** Execution of a complete instruction, sequencing of control signals, micro programmed control, microinstruction format, microinstruction sequencing, and bit slice concept	4
IV	**Memory hierarchy** Computer memory organization, RAM/main/primary memories, Read-Only memories, cache memories, mapping functions, replacement algorithms, performance consideration: Multimodal memories & interleaving, hit rate & miss penalty, multilevel cache organization, virtual memories, address translation, memory management requirement.	5
V	**I/O interface** Input-output organization, I/O mapped I/O and memory mapped I/O, Direct Memory Access (DMA), interrupts and interrupts handling mechanisms, device identification, vectored interrupts, interrupt nesting, I/O interfaces, synchronous vs. asynchronous data transfer, I/O channels	4

VI	**Pipelining** Basic concepts in pipelining, data hazards, instruction hazards, influence of pipelining on instruction set, data-path & control considerations, performance considerations, and Fyn's classification of computer architectures.	4

Textbooks	
1	J. Hayes , "Computer Architecture and Organization", McGraw Hill, 3rd edition, 2017
2	C. Hamacher et. al, *"Computer Organization"*, 5th edition, 2010

References	
1	D. Patterson, Morgan Kaufmann "*Computer Architecture*", 6th edition, 2017

Useful Links	
1	https://www.geeksforgeeks.org/computer-organization-and-architecture-tutorials/
2	https://www.coursera.org/learn/comparch#syllabus
3	https://www.javatpoint.com/computer-organization-and-architecture-tutorial

CO-PO Mapping

	Programme Outcomes (PO)												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3		1											
CO2			2											
CO3	2	3											1	

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.
ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
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AY 2022-23

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Second Year B. Tech., Sem IV
Course Code	
Course Name	Computer Networks
Desired Requisites:	Data Communication and Networking

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
		Credits: 3			

Course Objectives

1	To introduce software development process
2	To make able to comprehend the requirement gathering techniques using process model
3	To acquaint with object oriented design using the Unified Modelling Language (UML).

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Compare various process model for software development	II	Understanding
CO2	Apply software engineering process model to engineering problems	III	Applying
CO3	Create object oriented design for software development life cycle	VI	Creating

Module	**Module Contents**	**Hours**
I	**Data link layer** Framing, error control, flow control, The Channel Allocation Problem: Static & Dynamic Allocation, Multiple Access Protocols- ALOHA, CSMA, CSMA/CD. Ethernet Cabling, Coding, MAC Protocol, Frame structure, Binary exponential Back-Off Algorithm.	7
II	**Network Layer** Network Layer Design issues- Packet Switching, Services to transport layer, implementation of connection oriented & connectionless services, Routing- Static &Dynamic routing, flooding, Fragmentation. Congestion Control AlgorithmsPrinciples, Prevention Policies, Jitter & Load shedding. The Network Layer in the Internet- Address, Internet Control Protocols- SPF, BGP, IP operations, Subnetting , IP4, IPv6.	7
III	**Transport Layer** Elements of transport protocol- Addressing, connection establishment, release, flow control, buffering, multiplexing, crash recovery. UDP, RPC, RTP.	6
IV	**Transport Layer Protocol** TCP service model, TCP protocol, TCP segment header, TCP connection establishment, Release, congestion control in TCP, timer management.	6

V	**Application Layer** DNS—The Domain Name System-name space, resource records, name servers. Electronic Mail- architecture and service, user agent, message format and transfer final delivery. The World Wide Web-architecture overview, Application layer protocol: HTTP, FTP, SMTP.	7
VI	**Wireless and Mobile Technologies** Mobile technologies: GSM/GPRS, Introduction, Fundamentals of Satellite systems, Broadband satellite Networks.	6
Textbooks		
1	Andrew S. Tannenbaum, *"Computer Networks",* PHI, 5thEdition, 2013	
2	James F. Kurose, Keith W. Ross, *"Computer Networking: A Top-Down Approach"*, 6th Edition, Pearson Publication	
3	Behrouz A. Forouzan, *"Data Communication and Networking"* TMGH 4th edition., 2013	
References		
1	Jochen Schiller *"Mobile Communications",* Pearson Education, 2nd Edition,2000	
2	Theodore S. Rapport, "*Wireless communication (Principles and practice)",* Pearson Education, 2nd edition 2010	
3	Dr. Sunilkumar Manavi and M. Kakkasageri, *"Wireless and mobile networks concepts and protocols"*, Wiley publication, 2nd edition, 2016	
Useful Links		
1	https://www.coursera.org/learn/fundamentals-network-communications#syllabus	
2	https://www.udacity.com/course/computer-networking--ud436	

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	1												
CO2		2	1		2									
CO3			3										2	

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

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The assessment is based on MSE, ISE and ESE.
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(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Second Year B. Tech., Sem IV
Course Code	
Course Name	Software Engineering
Desired Requisites:	Object Oriented Language

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	3 Hrs/week	**MSE**	**ISE**	**ESE**	**Total**
Tutorial	-	30	20	50	100
		Credits: 3			

Course Objectives

1	To introduce the object-oriented concepts of Java
2	To demonstrate the Java API's like multithreading and socket programming
3	To present various applications of the GUI packages of Java

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Generalize the basic knowledge of object orientation with different properties as well as different features of Java	II	Understanding
CO2	Demonstrate the concepts of socket programming and multithreading	III	Applying
CO3	Implement the application using GUI with database connectivity	VI	Createing

Module	**Module Contents**	**Hours**
I	**Introduction & Software Processes** The S/W problem, the software Engineering Approach & Benefits. Software Process, Characteristics of a software process. Software requirements, problem Analysis, Requirements Specification. Cost estimation, project scheduling, staffing and personnel planning, Software Configuration Management plans, Quality Assurance plans, Project Monitoring Plans, Risk Management	7
II	**Software Design and Testing** Objective, Design principles, module level concepts, Design notation and specifications, Artifacts system design document & detailed design document, Structured Design methodology. Programming Practice, Metrics: Testing Fundamentals (manual and automated testing), Testing Levels, Functional testing, Structural testing, Testing object oriented Programs, Regression Testing, Types of testing tools	7
III	**Agile Processes** Agile Methodologies, Dynamic system development, Feature-driven Design, Crystal Agile Modelling.	5
IV	**Structural Modelling** Classes, Relationships, Common mechanisms. Diagrams, Class Diagrams, Interfaces, Types and Roles, Packages, Instances and Object Diagram	7

V	**Behavioral Modelling** Interactions, Use cases, Use case diagram, Interaction Diagrams and Activity diagrams, Events and signals, State Machines, Processes and Threads, Time and space, State chart diagrams.	6
VI	**Architectural Modelling** Components, Deployment, Collaboration, Patterns and Frame works, Component Diagrams and Deployment Diagrams	7

Textbooks	
1	Sommerville, "Software Engineering", Pearson Education India,New Delhi,1st Edition, 2006
2	Roger S Pressman, *"Software Engineering – A Practitioner's Approach",* McGraw Hill, USA, 7th Edition, 2007
3	Pankaj Jalote, *"An Integrated Approach to Software Engineering",* Narosa Publication, 3rd Edition, 2005
References	
1	Pfleeger, *"Software Engineering",* Pearson Education India, New Delhi, 3rd Edition,2009
2	Mike O'Docherty, *"Object-Oriented Analysis & Design: Understanding System Development with UML 2.0",* John Wiley & Sons Publication, 2nd Edition, 2005
3	Terry Quatrain,", *Visual Modeling with Rational Rose 2002 And UML*",Pearson,2006
Useful Links	
1	https://www.coursera.org/specializations/software-development-lifecycle#courses
2	https://www.udemy.com/course/sdlc-models/

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2								3		3			
CO2	1	2			2									
CO3		3											2	

The strength of mapping is to be written as 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.
ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Walchand College of Engineering, Sangli
(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Second Year B. Tech., Sem IV
Course Code	
Course Name	Computer Network Lab
Desired Requisites:	Data Communication and Networking

Teaching Scheme		**Examination Scheme (Marks)**			
Practical	2 Hrs/ Week	**LA1**	**LA2**	**Lab ESE**	**Total**
Interaction	-	30	30	40	100
		Credits: 1			

Course Objectives

1	To Explain methods of capturing and visualizing software requirements
2	To comprehend the concepts and principles of software design
3	To instruct fundamentals of testing and software quality assurance.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Convert the requirements model into the design model	III	Applying
CO2	Use software project management tools in software development life cycle	IV	Analysing
CO3	Rehash software component in development life cycle	IV	Analysing

List of Experiments / Lab Activities/Topics

List of Lab Activities:

1. Analyze different network devices on data link layer and design case study for all devices
2. Demonstrate half duplex and full duplex link in simulator and write the observations
3. Design different computer network topologies and evaluate its performance using network simulators
4. Demonstrate the communication through different topologies using TCP as an agent using network simulators
5. Demonstrate the communication through different topologies using UDP as an agent using network simulators
6. Evaluate performance of TCP and UDP with net centric computing parameters using network simulators
7. Create and simulate wired network scenario using NSG and configure the node
8. Create and simulate different wireless network scenario using NSG and configure the mobile nodes

Textbooks

1	Andrew S. Tannenbaum, *"Computer Networks",* PHI, 5thEdition, 2013
2	James F. Kurose, Keith W. Ross, *"Computer Networking: A Top-Down Approach"*, Pearson Publication, 5th Edition, 2012

References

1	Behrouz A. Forouzan , *"Data Communication and Networking"* TMGH 4th edition, 2017

2	Theodore S. Rapport, *"Wireless communication (Principles and practice), Pearson education,"* 2nd Edition, 2010

Useful Links	
1	https://nptel.ac.in/courses/106/105/106105183/
2	https://onlinecourses.swayam2.ac.in/cec19_cs07/preview
3	https://www.coursera.org/browse/information-technology/networking

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2													
CO2		3											1	
CO3									2				2	

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO, and preferably to only one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%

Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

Walchand College of Engineering, Sangli
(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Second Year B. Tech., Sem IV
Course Code	
Course Name	Software Engineering Lab
Desired Requisites:	Object Oriented Programming

Teaching Scheme		**Examination Scheme (Marks)**			
Practical	2 Hrs/ Week	**LA1**	**LA2**	**Lab ESE**	**Total**
Interaction	-	30	30	40	100
		Credits: 1			

Course Objectives

1	Exploit the concepts of Programming languages, tools and technologies
2	Survey the real world challenges & try to address it.
3	Design project modules to report solutions to various problems.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Convert the requirements model into the design model	II	Understanding
CO2	Use software project management tools in software development life cycle	III	Applying
CO3	Rehash software component in development life cycle	IV	Analysing

List of Experiments / Lab Activities/Topics

List of Lab Activities

1. To realize the phases in software development project, overview, need, coverage of topics
2. To assign the requirement engineering tasks
3. To perform the system analysis : Requirement analysis, SRS
4. To perform the function oriented diagram : DFD and Structured chart
5. To perform the user's view analysis : Use case diagram
6. To draw the structural view diagram : Class diagram, object diagram
7. To draw the behavioural view diagram : Sequence diagram, Collaboration diagram
8. To draw the behavioural view diagram : State-chart diagram, Activity diagram
9. To draw the implementation view diagram: Component diagram
10. To draw the environmental view diagram : Deployment diagram
11. To perform various testing using the testing tool unit testing, integration testing
12. To demonstrate the performance of server and web portal using modern engineering tools

Textbooks

1	Sommerville, *"Software Engineering",* Pearson Education India,New Delhi,1st Edition, 2006
2	Roger S Pressman, *"Software Engineering – A Practitioner's Approach",* McGraw Hill, USA, 7th Edition, 2007
3	Pankaj Jalote, *"An Integrated Approach to Software Engineering",* Narosa Publication, 3rd Edition, 2005

References

1	Pfleeger, "*Software Engineering",* Pearson Education India, New Delhi, 3rd Edition,2009

2	Mike O'Docherty, "*Object-Oriented Analysis & Design: Understanding System Development with UML 2.0"*, John Wiley & Sons Publication, 2nd Edition, 2005
3	Terry Quatrain*,"Visual Modelling with Rational Rose 2002 And UML*",Pearson, 3rd Edition, 2006
Useful Links	
1	https://onlinecourses.nptel.ac.in/noc19_cs69/preview
2	https://nptel.ac.in/courses/106/105/106105182/
3	https://www.coursera.org/specializations/software-development-lifecycle#courses

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	1			3									
CO2		2									1			
CO3			3										2	

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO, and preferably to only one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%

Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

Walchand College of Engineering, Sangli
(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Second Year B. Tech., Sem IV
Course Code	
Course Name	Java Programming Lab
Desired Requisites:	Object Oriented Programming

Teaching Scheme		**Examination Scheme (Marks)**			
Practical	2 Hrs/ Week	**LA1**	**LA2**	**Lab ESE**	**Total**
Interaction	1 Hr/week -	30	30	40	100
		Credits: 2			

Course Objectives

1	To introduce the object-oriented concepts of Java
2	To demonstrate the Java API's like multithreading and socket programming
3	To present various applications of the GUI packages of Java

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	Define the basic knowledge of object orientation with different properties as well as different features of Java	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Define the basic knowledge of object orientation with different properties as well as different features of Java	III	Applying
CO2	Demonstrate the concepts of socket programming and multithreading	IV	Analysing
CO3	Implement the application using GUI with database connectivity	VI	Creating

Module	**Module Contents**	**Hours**
I	**Fundamental Programming in Java** Structure of Java Program, Java programming environment-JVM, JIT Compiler, Bytecode, A simple Java program, source file declaration rules, naming conventions, objects and classes – declaring classes and objects, declaring member variables, defining methods, constructors, using objects, this keyword, final and static keyword, garbage collection	3
II	**Inheritance and package** What is inheritance, types of inheritance, interfaces, super keyword, final classes and methods, packages – importing packages, naming a package, creating a package	2
III	**Exception Handling and I/O** Exception handling – what is exception? dealing with errors, hierarchy of exception, types of exceptions, IO stream classes	2
IV	**Event Handling, AWT and Swing** Event handling – basics of event handling, AWT hierarchy, types of events, AWT components, swing advanced components.	2
V	**Multithreading and Networking** Processes and threads, runnable interface, thread class, thread objects, thread states, thread priorities, socket programming	2
VI	**Database Handling and Collections Framework** Database – design of JDBC, the structured query language, JDBC types, Driver Manager - statement, connection, result-set, Collections - Collection framework	2

List of Experiments / Lab Activities/Topics
List of Lab Activities: 1. Program on input/output stream. 2. Program on class and objects. 3. Program on Constructor/Destructors. 4. Program static variables/class/functions. 5. Program on polymorphism. 6. Program on different types of inheritance and interface. 7. Program on exception handling objects. 8. Program on multithreading. 9. Program on TCP/UDP communication. 10. Program on Swing components. 11. Program on AWT components. 12. Program on Database Connectivity and operations for data handling. 13. Program on different collections like TreeSet, Set, HashMap, ArrayList, Date,etc.

Textbooks	
1	Cay S. Horstmann, "*Core Java Volume I Fundamentals*", Prentice Hall, 11th Edition, 2018
2	Cay S. Horstmann, "*Core Java Volume II Advanced Features*", Prentice Hall, 11th Edition, 2019
References	
1	Herbert Schildt, "*Java: The Complete Reference*", McGraw Hill Education, 9th Edition, 2014
2	E. Balguruswamy, "*Programming with Java: A Primer*", McGraw Hill Education, 5th Edition, 2014
Useful Links	
1	https://www.coursera.org/specializations/object-oriented-programming
2	https://www.udemy.com/course/java-tutorial/
3	https://www.codecademy.com/learn/learn-java

CO-PO Mapping														
	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1		2		1										
CO2									2					
CO3					2									1
The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO, and preferably to only one PO.														

Assessment				
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%				
Assessment	**Based on**	**Conducted by**	**Typical Schedule**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

Walchand College of Engineering, Sangli *(Government Aided Autonomous Institute)*					
AY 2022-23					
Course Information					
Programme	B.Tech. (Information Technology)				
Class, Semester	Second Year B. Tech., Sem IV				
Course Code					
Course Name	Android Programming Lab				
Desired Requisites:	Object oriented programming concepts, Java Programming				
Teaching Scheme		**Examination Scheme (Marks)**			
Practical	2 Hrs/ Week	**LA1**	**LA2**	**Lab ESE**	**Total**
Interaction	-1 Hr/week	30	30	40	100
		Credits: 2			

Course Objectives	
1	To introduce the android architecture and tools for developing Android applications
2	To impart current client side and server side web technologies on Android platform
3	To provide user interface application development

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	Course Outcome Statement/s	Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Describe the life cycles of Activities	III	Applying
CO2	Use the major components of Android API to develop their own apps	IV	Analysing
CO3	Deploy applications to the Android marketplace for distribution.	VI	Creating

Module	Module Contents	Hours
I	**Android Overview** Android Software Development, building a sample Android application using Android Studio. Android Project Structure, Android Manifest File and its common settings.	2
II	**Intents and Layouts** XML, Android View Hierarchies, Linear Layouts, Relative Layout, Table Layout, Frame Layout Sliding, Using Padding and Margins with Layouts. What is Intent? Android Intent Messaging via Intent Objects, Types of Intents, Using Intents with Activities, Sending Intents (Telephony, SMS), Broadcast Receivers	2
III	**Input Controls, Input Events, Dialogs** Buttons, Text Fields, Checkboxes, Radio Buttons, Toggle Buttons, Spinners, Event Listeners, Event Handlers, Touch Mode, Handling Focus, Dialogs: Alerts, Popups, Toasts	3

IV	**Menus, Notification and ActionBar** Menus, Options menu, Context menu, Popup menu, Handling menu click events, Creating a Notification, Notification actions, Notification priority, Managing Notifications, Removing notifications	2
V	**Android Database** Installing SQLite plugin, DbHelper, The Database Schema and Its Creation, Four Major Operations, Cursors, Example, overview of other database used for Android	2
VI	**Publishing Android Application** To deploy and publish the Mobile Apps, Introduction to Flutter and Kotlin, Permissions, Application resources. open source and public APIs in Mobile developments	2

List of Experiments / Lab Activities/Topics

List of Experiments:

1. Installation of Android SDK, emulator, creating simple project and study of android project structure.
2. Installing apk on mobile device/tablet, configuring mobile device/tablet in Android Studio with developer option and running app directly on mobile device/tablet.
3. Write a program to use of different layouts.(Create Login form using Linear Layout and Relative Layout).
4. Write a program to study Intents for switching between activities. - Create Registration Activity and Registration Layout
5. Write a program to use of Intents for SMS and Telephony
6. Write a program to study and demonstrate BroadcastReceiver
7. Write a program to demonstrate Buttons, Text Fields, Checkboxes, Radio Buttons, and Toggle Buttons with their events handler (Create an app which will cover the different components, and try adding the components and different events henceforth so as to create a fully developed Android application)
8. Write a program to demonstrate Spinners, Touch Mode, Alerts, Popups, and Toasts with their events handler
9. Write a program to demonstrate Touch Mode, Menus with their events handler
10. Write a program to demonstrate notification with their action
11. Write a program to study and use of SQLite database
12. Study of publishing app to the Android Market.

Textbooks

1	Beginning Android application development by Wei-Mag Lee
2	Learning Android by Marko Gargenta Publisher: O'Reilly Media
3	Android Apps for Absolute Beginners by Wallace Jackson 2nd Edition

References

1	Reto Meier Publisher,"Professional Android 4 Application Development" Wiley India
2	Android in Action Third Edition W.Frank Ableson,Robi Sen, Chris King, C. Enrique Ortiz
3	The Android Developer's Cook book *"Building Applications with the Android SDK"* by James Steele

Useful Links

1	https://developer.android.com/guide
2	https://www.classcentral.com/course/androidpart1-1178
3	https://www.udemy.com/topic/android-development/
4	https://kotlinlang.org/docs/home.html
5	https://developer.apple.com/tutorials/SwiftUI

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1		2		1										
CO2									2					
CO3					2									1
The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO, and preferably to only one PO.														

Assessment				
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%				
Assessment	**Based on**	**Conducted by**	**Typical Schedule**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40
Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.				

Walchand College of Engineering, Sangli
(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Second Year B. Tech., Sem IV
Course Code	
Course Name	Mini Project 1*
Desired Requisites:	Programming fundamentals

Teaching Scheme		**Examination Scheme (Marks)**			
Practical	2 Hrs/ Week	**LA1**	**LA2**	**Lab ESE**	**Total**
Interaction	-	30	30	40	100
		Credits: 1			

Course Objectives

1	To provide guidance to select & build the ideas.
2	To help students to address real-world challenges by IT based Solution.
3	To guide students to acquaint with team spirit.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**Course Outcome Statement/s**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Exploit the concepts of Programming languages, tools and technologies	III	Applying
CO2	Survey the real world challenges & try to address it.	V	Evaluating
CO3	Design project modules to report solutions to various problems.	VI	Creating

List of Experiments / Lab Activities/Topics

List of Lab Activities:

Mini-project is to be carried out in a group of maximum 3 to 5 students.
Each group will carry out mini-project on developing any application software based on following areas.
1. C/C++/Python or any equivalent language.
2. Industry Problem Statement (Sponsored Project)
3. Problem statements based on current or previously learned Technology.

Project/Mini-Project group should submit workable project at the end of second semester.
Project report (pre-defined template) should be prepared using Latex/Word and submitted along with soft copy on CD/DVD (with code, PPT, PDF, Text report document & reference material) or on online Github.
Students should maintain a project log book containing weekly progress of the project.

Textbooks

1	--

References

1	--

Useful Links

1	--

CO-PO Mapping

	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1		1			2								3	2
CO2											2		2	1
CO3					2					3				

The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High
Each CO of the course must map to at least one PO, and preferably to only one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.
IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%

Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

Walchand College of Engineering, Sangli
(Government Aided Autonomous Institute)

AY 2022-23

Course Information

Programme	B.Tech. (Information Technology)
Class, Semester	Second Year B. Tech., Sem IV
Course Code	
Course Name	Intellectual Property Rights.
Desired Requisites:	NA

Teaching Scheme		**Examination Scheme (Marks)**			
Practical	2 Hrs/ Week	**LA1**	**LA2**	**Lab ESE**	**Total**
Interaction	-	30	30	40	100
		Credits: 3			

Course Objectives

1	To disseminate fundamental aspects of Intellectual property Rights and its process
2	To provide awareness of IPR and government policies about IPR.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	**After the completion of the course the student should be able to**	**Bloom's Taxonomy Level**	**Bloom's Taxonomy Description**
CO1	Identify and apply IPR for intellectual work.	III	Applying
CO2	Analyze the intellectual work for economical, moral, ethical issues and social importance with respect to IPR	IV	Analysing

List of Experiments / Lab Activities/Topics

List of Lab Activities:

Textbooks

1	Howard B. Rockman, "Intellectual Property Law for Engineers and Scientists" Wiley, first edition, May 2004.
2	JeffreyG. Sheldon, How to Write a Patent Application, Third Edition, Practising Law Institute, 2016.

References

1	Indian Patents Act, 1970
2	Ove Granstrand, The Economic and management of Intellectual Property, 1999
3	Narayanan, V. K., Managing technology and innovation for competitive advantage, first edition, Pearson education, New Delhi, 2006
4	Idris, K., Intellectual property: a power tool for economic growth, second edition, WIPO publication no. 888,Switzerland, 2003
5	Additional Reading - WIPO - http://www.wipo.int/patents/en/

Useful Links

1	--
2	--
3	--

Course Contents:

Module	Module Contents	Hours
I	**Module 1: Fundamentals of IPR:-** Introduction to IPR: Definition, Types of IPR, IPR Acts, Nature of Intellectual Property right(IPR) protection of IP, IPR and Economic Development, Instruments relating to the protection of IP:Berne Convention, Paris Convention, TRIPS	3
II	**Module 2: Patent and patentability:-** Introduction to patent: Definition, concepts, Patentability Criteria:How to Identify whether my invention is patentable?,Criteria for obtaining patents:Novelty, Inventive step, Utility, Non patentable inventions, Patentability check - various tools. Understanding the Patents Act, 1970, Prioir art and patent.	5
III	**Module 3: Patents procedures and filing:-** Procedure for registration/filing (forms) , Term of patent , Rights of patentee, Basic concept of Compulsory license and Government use of patent, Infringement of patents and remedies. Important sections of form2. Drafting patent and claim	5
IV	**Module 4: Copyright, Trademark, Designs and Geographical Indication(GI) :-** Copy right :Ownership of copyright, Term of copyright, Rights of owner:Economic Rights, Moral Rights, Assignment and license of rights, Performers rights and Broadcasters rights, Infringement of copyright, Fail use and Fair Dealing concepts, Categories of Trademark: Certification Mark, Collective Mark , Well known Mark and Non-conventional Marks, Concept of distinctiveness, Doctrine honest user, registration and protection. Design: Concept of original design, Difference between GI and Trade Marks, Concept of Authorized user, GI: Homonymous GI.	6
V	**Module 5: Patent Licensing ;-** Compulsory Licensing; Compulsory Licensing—Working of Patents, Grounds for Grant of Compulsory License, Revocation; Patent Licensing.	3
VI	**Module 6: Types of patent applications:-** Compulsory Licensing; Compulsory Licensing—Working of Patents, Grounds for Grant of Compulsory License, Revocation; Patent Licensing; Patent Applications ; Patent Application—Who Can Apply, True and First Inventor, How to Make a Patent Application, What to include in a Patent Application, Types of Patent Applications, Patents of Addition, Dating of Application.	4

CO-PO Mapping														
	Programme Outcomes (PO)												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3			2									1	
CO2												2		
The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High Each CO of the course must map to at least one PO, and preferably to only one PO.														

Assessment				
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%				
Assessment	**Based on**	**Conducted by**	**Typical Schedule**	**Marks**
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40
Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.				